

ENERGY AROUND US

UNIT OVERVIEW

Although not blessed with an exciting title, "Energy Around Us", is a powerful unit. Students examine the very nature of energy, its many forms and the changes it can undergo. In general, students learn basic concepts and information as they go through a series of student notes. The notes are followed by meaningful activities associated with the theme of each lesson. To further captivate student interest, many of these activities have been designed around the "Science Challenge Format" in which small groups of students work cooperatively to solve various problems. Learning, integrated with fun, is the order of the day and your science class may never be as energetic.

STUDENT ASSIGNMENTS AND ACTIVITIES

- | | | |
|---|---|--|
| 1. Energy, Kinetic Energy, Light | - | Illustrated Energy Alphabet |
| 2. Heat Energy | - | Ice Cube Meltdown (Science Challenge #1) |
| 3. Electricity | - | How To Open A Jar Lid...(Worksheet) |
| 4. Chemical Energy | - | Calorie Counter (Worksheet) |
| 5. Elastic/Spring Potential Energy | - | Paddlewheeler (Science Challenge #2) |
| 6. Gravity Potential Energy | - | Popcorn Launcher (Science Challenge #3) |
| 7. Law of Conservation of Energy | - | Energetic Cartoons (Worksheet) |
| 8. Renewable Energy (Solar, Wind, Hydro) | - | Windmill Penny Lifter (Science Challenge #4) |
| 9. Non-renewable Energy (Fossil Fuels, Nuclear) | - | Energy Pictograms (Science Challenge #5) |
| 10. Review | - | A review is included. |

OPTIONAL ACTIVITIES

1. Energy Wordsearch
2. Energy Crossword (Enrichment)
3. How a Microwave Oven Works (Reading Activity - Worksheet)
4. Milkfat and Food Colouring
5. I Scream For Ice Cream
6. Making Sandpaper
7. Energy Conservation/Project Suggestions

SCIENCE CHALLENGE ACTIVITIES

Many of the lessons in this unit use science challenge activities to help students apply what they have learned from the notes. The goals of science challenge are:

- 1) to help students learn to solve "real" science problems
- 2) to help students work cooperatively within groups.

The activities are usually somewhat competitive in nature and small prizes such as bite-sized chocolate bars can help make the activity more interesting. However, it is important that students do not get too carried away and learn to work cooperatively. An evaluation sheet has been included on the next page to easily monitor student cooperative work skills. Each student begins with twenty out of twenty or 100%. If a student fails to work cooperatively in one of the categories (Which should be explained in advance) a mark is taken off. Students quickly become aware of what acceptable behaviour is and strive to keep their 100%.

ENERGY PICTOGRAMS

Name: _____

PART I - TYPES OF ENERGY

- ① + ready, willing and _____!
- ② + _____
- ③ + _____
- ④ + answer from #3
- ⑤ + _____
- ⑥ - W
(hint: used to make flour)

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ENERGY REVIEW

Name: _____

I. Match

- | | |
|--|------------------------------|
| a) Energy of a slingshot | ___ Kinetic Energy |
| b) A tight beam of concentrated light energy | ___ Chemical Energy |
| c) Caused when two things rub together | ___ Light Energy |
| d) Energy produced with dams, water and spinning turbines | ___ Elastic Potential Energy |
| e) Energy made by splitting atoms | ___ Gravity Potential Energy |
| f) Energy that can be used up like oil and coal | ___ Spring Potential Energy |
| g) Friction often creates this kind of energy | ___ Electricity |
| h) Burning a piece of wood | ___ Friction |
| i) A rock held 50m off the ground has this | ___ Heat |
| j) Energy of the sun | ___ Nuclear Energy |
| k) Energy that never runs out | ___ Renewable Energy |
| l) A ball whizzing through the air has this kind of energy | ___ Laser |
| m) A type of radiant energy | ___ Non-renewable Energy |
| n) Energy of some pens that "click" | ___ Solar Energy |
| o) Energy of moving electrons | ___ Hydroelectric Energy |

II Short Answer (Answer In Full Sentences where possible)

1. List three examples of kinetic energy.

- a) _____
- b) _____
- c) _____

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ENERGY CROSSWORD

Name: _____

CLUES

Across

1. The James Bay project is famous as the world's largest producer of this type of energy.
3. Mechanical energy could also be called this.
5. Shock absorbers in cars use these to keep the ride smooth.
8. The fossil fuel of Saudi Arabia. Jed Clampet hit this with a hunting rifle.
9. Marconi sent the first radio waves across the Atlantic from this place.
12. What dentists and doctors use to get an "inside" look.
13. Lighting is this kind of energy.
16. This could result if you "rub someone the wrong way."
18. This is made of all the colors of the rainbow. (ROYGBV)
20. Energy that rockets use to go into space.
21. Energy that is stored.
22. This type of energy is measured in decibels.
23. This person discovered (did not invent) electricity with a famous kite and key experiment.
24. Light, microwaves, and x-rays are all examples of this type of energy.

Down

2. Inventor of the light bulb.
4. A fossil fuel derived from dead plants.
6. Bart Simpson uses this (device to 1) convert elastic potential energy into kinetic energy, and 2) get into lots of trouble.
7. The Dutch in Holland are famous for using this energy device.
10. This is tight beam of light now commonly used in eye surgery.
11. This metal expands inside a thermometer when the temperature goes up.
14. Ocean currents moving are an example of this.
15. Chernobyl is famous for this kind of disaster.
17. Measures heat energy.
19. Used to send T.V. and phone signals as well as to cook food.



How Do Microwave Ovens Work?

Microwaves that have crests that are exactly 22cm apart are very special. These waves are able to travel through most things like air or plastic without anything happening. However, when these special microwaves hit a molecule of water (H₂O), they cause the water molecules to spin. Spinning molecules have a higher temperature than molecules that are not moving too much. In a microwave oven, magnetrons produce microwaves with crests exactly 22cm across, and these are used to heat the water molecules inside the food. This is why microwave ovens seem to cook from the "inside out" and are usually faster than normal ovens.

Dangers Of Microwaves

Microwave radiation sometimes escapes out of a microwave oven if there are leaks or bad seals. Stray microwaves might cause the water molecules in your body to spin and heat up (a person's body is 90% water) if you stand too close.

Metals are also not very safe in a microwave oven mainly because they reflect the microwaves, resulting in extreme heating or sparks called arcing.



Microwaves can also cause explosions in certain foods which is sometimes dangerous. For example, when cooking an egg, the microwaves go straight through the calcium shell which contains no water and into the center yolk of the egg. Inside the shell, the water molecules are made to spin and when they get very hot they turn to steam. This extremely hot steam has no place to go because of the shell and might build up until the egg explodes. This is why a person should make holes in the egg shell with a fork before microwaving the egg. You wouldn't want to end up with egg on your face - especially if the egg is hot enough to give a person a permanent third degree burn.



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ENERGY WORDSEARCH

Name: _____

G V Q Z H X H F P N T R O D B M C Y J R
 J R J O M E S C O A E E N M U I D C X Q
 L F A X G L D I E S E L N A R C A L J N
 R T K V V E T H A P S K U T N R I A U J
 C H E M I C A L F F R I C T I O N P I N
 X K I N E T I C W O L E L E N W K V J X
 X T M V U R Y E W C L J E F G A B A Y S
 Q C N B X I A P E E E B A A U V I P A G
 C O N D U C T I O N T Y R T S E Q G J G
 C A L O R I E R A T M W X H Q S L Y R F
 G L I G H T D P F W E Q B I H A O W J S
 H U P T L Y O Q A I M N A Z R S T U P O
 A L M K H R Q S B X H N T U D S Z I N D
 P Z V S P I B T E L A S T I C X K E M D
 X J M N K N O L A S Y A E M A I Q L Y H
 S J P H U D Q T P A N J R B J L H X R Q
 K Q Y Q O V N L R J K K Y G Q A U T T A
 D Y U R G G K X B G D E T O N X A O E S
 H F R C C J W J P Y V T R I R B W K I W
 Q J N E M E R G U J N E T P L R D W B I

Types of Energy

LIGHT
 KINETIC
 SOUND
 NUCLEAR
 WORK

CHEMICAL
 ELASTIC
 MICROWAVES
 HYDROELECTRIC
 GRAVITY POTENTIAL

POTENTIAL
 HEAT
 X-RAYS
 FRICTION
 ELECTRICITY

Energy Words

CONDUCTION
 BURNING
 NATURAL GAS
 DIESEL

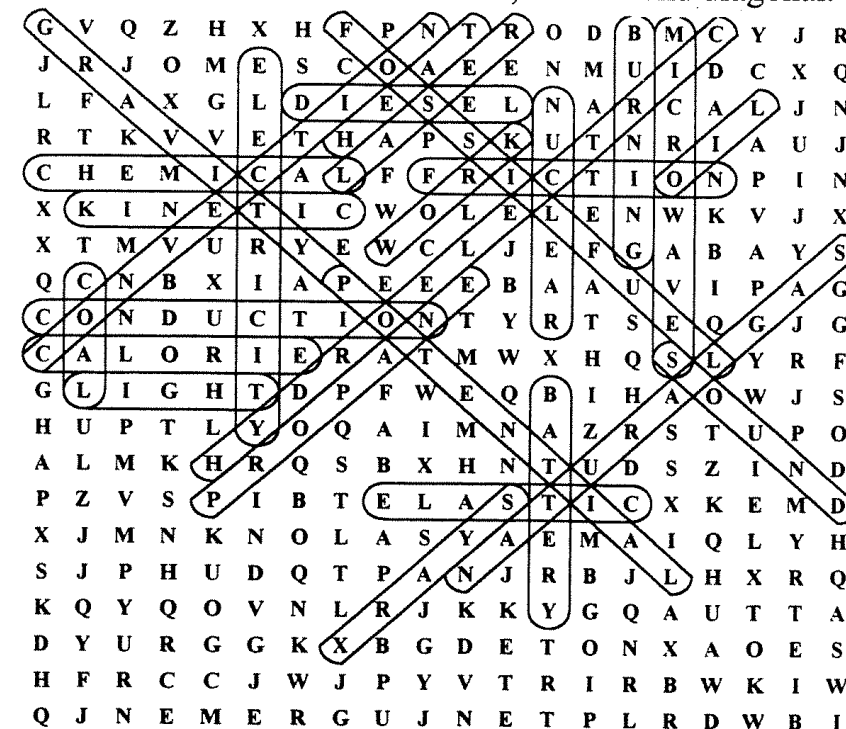
CONVECTION
 LASER
 FOSSIL FUEL
 PROPANE

CALORIE
 OIL
 COAL
 BATTERY

ANSWER KEY

NAL LESSON #1 - Energy Wordsearch

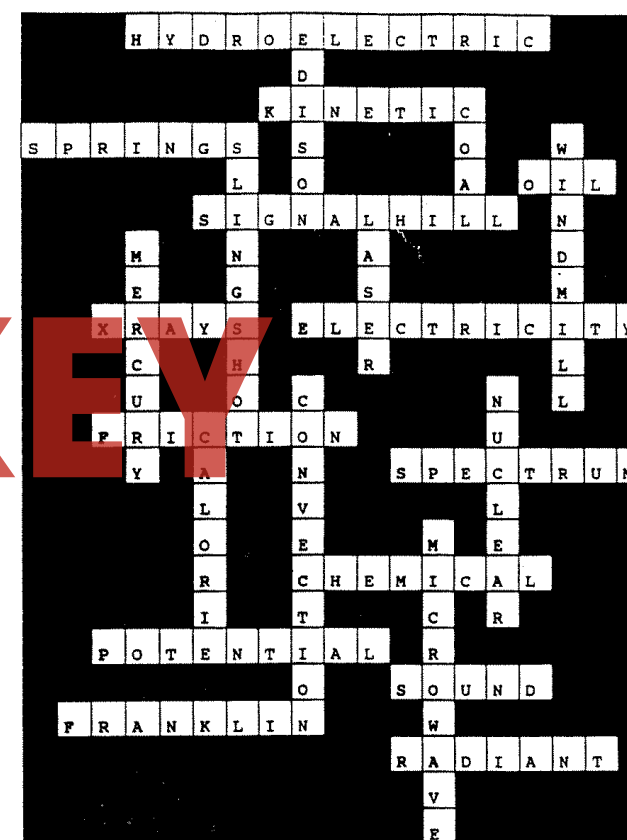
Wordsearch contains words that are horizontal, vertical and diagonal.



NAL LESSON #2 - Enrichment Crossword

This difficult crossword is meant to be a challenge. Independent students use various resources in the classroom to find answers.

Solution



NAL LESSON #3 - How a Microwave Oven Works (Worksheet)

Students read an informative article about microwaves (a type of radiant energy) and answer related questions on an accompanying worksheet.